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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/783,121	02/20/2004	Rune Hansen	4215-16	1236
7590	03/16/2006		EXAMINER	
Lance J. Lieberman, Esq. Cohen, Pontani, Lieberman & Pavane Suite 1210 551 Fifth Avenue New York, NY 10176			JAWORSKI, FRANCIS J	
			ART UNIT	PAPER NUMBER
			3737	
DATE MAILED: 03/16/2006				

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

<b>Application No.</b> 10/783,121		<b>Applicant(s)</b> HANSEN ET AL.	
<b>Examiner</b> Jaworski Francis J.		<b>Art Unit</b> 3737	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 7-15-04 Decl.
- 2a) ☐ This action is **FINAL**.
- 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-17 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Umemura (US5523058) since in Fig. 1, col.6 lines 22-28 as exemplary and col. 8 lines 25-42 an ultrasonic method is set forth in which a phase-delayed harmonic is transmitted superimposed on the fundamental so as to cause enhanced cavitation bubbling at the region of interest for therapy, which cavitation bubbles serve as a contrast agent for imaging of higher order harmonics generated by the bubbles by the imaging sub-portion of the combined system.

Alternately stated, the Examiner is arguing that claim 1 is readable against a therapeutic process of waveform combination which produces the contrast agent in the form of cavitation bubbles whose higher order harmonics are then imaged to monitor the generation site.

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Claim 1 is further rejected under 35 U.S.C. 102(e) as being anticipated by Bradley et al (US6905467) which teaches that an ultrasonic waveform summation generator or other synthesis process (col. 6 lines 30-50) may be used to composite a fundamental which is 'pre-distorted' by the superposition of a phase-delayed harmonic (col. 8 lines 22-29) including between 0 and  $\pi/2$  phase lag (col. 9 lines 17 – 53) in order to pre-negate the effect of contaminant harmonic non-linearities in the transmitter or transducer components or the intervening signal path to the region of interest where contrast agent harmonics including higher order harmonics (col. 4 lines 30-43) are to be investigated.

Alternately stated, the examiner is arguing that the claim reads against a method of compensating a conventional fundamental waveform used during contrast agent imaging.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

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not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1 – 13, 16 -17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hao et al (US6953434). Hao et al teach a method for contrast agent imaging by enhancing both contrast agent- tissue-ratio (CTR) and contrast agent-noise-ratio (CNR, generically called SNR therein) using composite stepped chirp waveforms which include a fundamental (fl) and its harmonic(fh) which is phase-adjusted in relation thereto (col.5 lines 32-49) , and for imaging of higher contrast agent harmonics (col. 8 lines 26 – 36).

With respect to claims 1 - 2, whereas Hao et al discuss phase delay and wave half-cycles in relation to bubble compression times, it would have been obvious to select delays of  $0 - \pi/2$  since bubble population sizes i.e. bubble radii vary in relation to selected frequencies or a portion of the bubble expansion period may be used (col. 5 lines 50-65 as exemplary). RF filtering is practiced within receiver 240 to obtain the higher order harmonics, see col. 8 lines 27 – 36.

With respect to claims 3 – 13, 16 - 17, unlike the case with the conventional double-pulse phase inversion contrast agent imaging process, Hao et al suggest a partial phase inversion i.e. inversion of only one of the fundamental or harmonic component between the double pulsation of a scanline for summation(col. 7 lines 40 – 57) including filtering using K such stepped pulses during scanning and with same or differing amplitudes for emphasis of the contrast agent in relation to tissue. Otherwise

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the optimization of the CTR/CNR is tantamount to a maximum signal (power) during viewing.

Claims 14 – 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hao et al as applied to claims above, and further in view of Mine et al (US5724976).

Whereas the former does not specify probe type, it would have been obvious in view of the latter col. 19 lines 25 – 27 to consider an electronic array scanning probe and a mechanical probe as scanning equivalents. (Mine et al is otherwise not relied upon for its extensive disclosure directed to contrast medium transducers and cardiac kinetics display.) Since phase inversion must be practiced along the same or nearby scanline it would have been inherently obvious to step scan or pause for a time sufficient to double pulse in order to accomplish same.

Umemura et al (US2004/0152985, eff. Date 7/18/03) is directed to superposition of a phase-shifted harmonic onto the transmission fundamental for alternating contrast agent preservation or destruction enhancement, paras [0025-26] and imaging is alternatively practiced with conventional double pulsing of this waveform with phase inversion of the entire waveform or double-pulse differencing using the entire waveform.

Mao et al (US6960169) is directed to contrast agent imaging by cascaded multiple frequency pulsing which is characterizable as a phase related ('overlapping') fundamental and harmonic transmission with intermodulation product signal recovery in the receiver for improving both the CTR and CNR (Abstract, col. 9 lines 1 - 21), and conventional dual pulse phase inversion of the entire waveform is practiced therewith.

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Kawagishi et al (US6899679) practices double pulsation contrast agent imaging with different centerbands in order to broaden bandwidth of harmonic contrast agent response.

Kawagishi et al (US20040254462, of ineffective date) is directed to transmission of first and phase-delayed higher frequency fundamentals in a composite pulse with interaction of the difference frequency and a harmonic of one of the fundamentals as the received signal for contrast agent imaging enhancement.


Jensen (US6656123) is directed to formation of a multiple frequency transmission of fundamental and harmonic of varying amplitude and phase in element 16 for higher order contrast agent imaging, with phase inversion double pulsation practiced on the fundamental (see. Equation col. 6).

Maxwell et al (US6514206) uses simultaneous dual transmit scaled harmonic and fundamental waveforms for enhanced contrast agent imaging as per col. 3 lines 36 – 56, col. 6 lines 19-21 and may also use a phase inversion scheme, cols. 3-4, bridging.. Holley et al (US5902243) is directed to multiple component transmission for pre-distortion and with partial phase or polarity inversion during double pulse operation in order to compensate for system non-linearities as per method of fig. 22.

Any inquiry concerning this communication should be directed to Jaworski Francis J. at telephone number 571-272-4738

.FJJ:fjj

120805

  
Francis J. Jaworski  
Primary Examiner